Deep Learning Approaches to Person Re-identification

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Declaration

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as part of the collaborative doctoral degree and/or fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis. This research is supported by the Australian Government Research Training Program.

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Abstract

Recent years witnessed a dramatic increase of the surveillance cameras in the city. There is thus an urgent demand for person re-identification (re-ID) algorithms. Person re-identification aims to find the target person in other non-overlapping camera views, which is critical in practical applications. In this thesis, I present my research on person re-ID in three settings: supervised re-ID, one-example re-ID and unsupervised re-ID. For supervised setting, a re-ranking algorithm is introduced that can improve the existing re-ID results with Bayesian query expansion. We also investigate pedestrian attributes for re-ID that learns a re-ID embedding and at the same time predicts pedestrian attributes. Since supervised methods require a large amount of annotated training data, which is expensive and not applicable for real-world applications, two re-ID methods on the one-example setting are studied. We also propose an unsupervised re-ID method that jointly optimizes a CNN model and the relationship among the individual samples. The experimental results demonstrate that our algorithm is not only superior to state-of-the-art unsupervised re-ID approaches but also performs favourably than competing transfer learning and semi-supervised learning methods. Finally, I make conclusions on my work and put forward some future directions on the re-ID task.

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